

13' W. End on the 23d, wind WNW. Highest force of wind 11; shifts W. by S.-W. by N.

British S. S. *Paul Paix*:

From the 15th, in latitude 51° 16' N., longitude 11° 47' W., to the 26th in latitude 39° 54' N., longitude 32° 56' W., a series of strong westerly gales with mountainous seas and violent squalls, sometimes of hurricane force, with rain and hail from NW. and W. and torrential rain from SW. Barometer ranged from 29.14 inches (lowest), in latitude 51° 07' N., longitude 13° 35' W., at 2 a. m. on the 16th to 30.16 inches (highest) in latitude 39° 34' N., longitude 32° 50' W., at 7 p. m. on the 26th.

American S. S. *Tripp*:

Gale began on the 18th, wind W. Lowest barometer 29.38 inches at noon on the 19th, wind NW., 9, in latitude 45° 25' N., longitude 10° 27' W. End on the 20th, wind W., 6. Highest force of wind 10, NNW.; shifts S.-SW.-W.-NW.

French S. S. *Chicago*:

Gale began on the 19th, wind W. Lowest barometer 28.73 inches at 2:35 a. m. on the 23d, wind W., 10, in latitude 48° 05' N., longitude 31° 52' W. End on the 26th, wind NW. Highest force of wind 11, W.; shifts W.-NW.

British S. S. *City of Shanghai*:

Gale began on the 18th, wind W. Lowest barometer 29.69 inches at 4 a. m. on the 19th, wind W., 9, in latitude 37° 28' N., longitude 12° 30' E. End on the 22d, wind W. Highest force of wind 11; steady W.

Dutch S. S. *Venezuela*:

Gale began on the 20th, wind WNW., 9. Lowest barometer 29.35 inches on the 23d, wind WNW., 11, in latitude 41° 26' N., longitude 25° 37' W. End on the 25th, wind NW., 6. Highest force of wind 11, WNW.; shifts WNW.-NW.

British S. S. *Chickahominy*:

Gale began on the 24th, wind WSW. Lowest barometer 28.95 inches at 3 p. m. on the 24th, wind WSW., in latitude 51° 38' N., longitude 26° W. End on the 25th, wind WSW. Highest force of wind 10; steady WSW.

British S. S. *Valacia*:

Gale began on the 25th, wind S. Lowest barometer 28.25 inches at 3:30 a. m. on the 26th, wind SW., 12, in latitude 49° 40' N., longitude 12° 24' W. End on the 26th, wind WNW. Highest force of wind 12; shifts SW.-W.-WNW.

French S. S. *Paris*:

Gale began on the 25th, wind SSE. Lowest barometer 28.15 inches at 2 a. m. on the 26th, wind SW., 8, in latitude 49° 36' N., longitude 15° 11' W. End on the 27th, wind NW. Highest force of wind 12; shifts SW.-W.-WNW.

On the 19th an area of low pressure was central about 300 miles east of St. Johns, N. F., with westerly gales in the southern quadrants. This low moved rapidly northeastward and by the 21st had joined forces with the eastern disturbance. Storm log:

Danish S. S. *Hellig Olav*:

Gale began on the 19th, wind SSW. Lowest barometer 29.25 inches at 8 a. m. on the 19th, wind SSW., 8, in latitude 44° 18' N., longitude 45° 08' W. End on the 21st, wind WNW. Highest force of wind 9; shifts SSW.-WNW.

On the 24th winds of gale force were encountered in mid-ocean as far south as the 33d parallel, as shown by following storm log:

Italian S. S. *Alberta*:

Gale began on the 24th, wind WNW. Lowest barometer 29.47 inches at 10 p. m. on the 24th, in latitude 32° 34' N., longitude 50° 10' W. End of gale on the 25th, wind N. Highest force of wind 9; shifts WSW.-N.

On the 27th there was a moderate disturbance off the Virginia coast that moved eastward with a fairly rapid rate of translation and on the 28th was central near the Bermudas. Storm log:

Italian S. S. *Alberta*:

Gale began on the 27th, wind SW. Lowest barometer 29.77 inches at 10:30 p. m., on the 27th, in latitude 34° 40' N., longitude 60° 15' W. End on the 28th, wind SW. Highest force of wind 10; shifts WSW.-NW.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

In comparison with the tempestuous weather prevailing over the North Atlantic Ocean during February, 1923, that over the North Pacific was apparently much quieter. Ordinary winter gales were of frequent occurrence over the northern routes, but only a few dangerous storms occurred. The one pronounced storm of this character was that which began on the night of the 12th, and continued through the 13th and 14th. This gale swept the coast of British Columbia, Washington, and Oregon, several vessels being wrecked in the neighborhood of Cape Flattery, including the British S. S. *Tuscan Prince*, off Vancouver Island. On the night of the 13th the Weather Bureau station at Tatoosh Island reported a maximum wind velocity of 86 miles per hour from the northeast. The high winds were accompanied by heavy rain or snow, which contributed greatly to the danger at sea. The American S. S. *Colusa*, in dock at Tacoma on the 14th, reported 18 inches of snow on deck. This storm covered a wide expanse of the eastern part of the ocean.

From the 11th to the 28th of the month the Canadian S. S. *Canadian Inventor*, Capt. R. P. Roberts, was on a voyage from Japan to San Francisco. The observer, Mr. W. A. Attwell, thus described the weather experienced:

Weather and general conditions experienced usual to the month; dull and gloomy, with very little fine weather. Rough to heavy sea a part of the time, but not really very bad or worse than might be looked for during winter months. Very little storm or fog.

At Honolulu the weather up to the 19th was cool and sunny, but cloudiness and rain characterized the weather of the remainder of the month. The winds were prevailing from the northeast and generally light, the average hourly velocity being only 6.7 miles per hour, as compared with the 19-year average of 8 miles for February. The one momentous occurrence to the Hawaiian Islands was the tidal wave which swept the east coasts and did considerable damage on the 3d, due to a seismic disturbance in the Pacific Ocean.

To the eastward of Hawaii the weather was generally good, and few gales occurred between there and the western coast of North America from California southward, except during the 14th to 16th. The American S. S. *Mahukona*, Capt. J. W. R. Steward, Kahului toward San Francisco, reported an entire and unusual absence of the trade winds on the trip, which began with the 9th.

From present information regarding the weather in Asiatic waters, the high-pressure area extending eastward from China was persistent until the 10th, and was again pronounced and steady after the 20th. Some moderate storm conditions occurred in this area during the interval, but most of the continental disturbances of the month entered the ocean from Manchuria and Siberia. On the 6th a depression appeared to the eastward of Luzon. It was over or near the Bonin Islands and southern Japan on the following day, whence it moved rapidly east-northeastward and combined with a great low-pressure area, which on the 8th and 9th was central approximately in longitude 165° E., between latitudes 35° and 40° N. Practically the whole central part of the ocean, or between 150° E. and 170° W., approximately, was at this time swept by gales, varying in force up to 10 as indicated by the vessel reports. The American S. S. *Broad Arrow*, Woosung, China, toward San Francisco, encountered moderate to whole gales on the 9th and 10th, with lowest pressure 28.51 inches, corrected, wind SW. 10, on the 9th, in latitude 38° 06' N.,

longitude 163° 50' E. The American S. S. *Stockton* on the same date experienced a south gale, force 10, lowest pressure 29.29 inches, in latitude 35° 14' N., longitude 174° 20' W.

On February 14 a cyclone issued from China, crossing lower Japan on the 15th and 16th, and proceeding thence on an easterly course. The British S. S. *Harold Dollar*, Capt. D. Clinton, Nagasaki toward San Pedro, was involved in this storm from the 16th, when in latitude 33° 56' N., longitude 142° 15' E., until the 18th, in latitude 35° 20' N., longitude 151° E. The highest wind force experienced by this vessel was 10 from the NW. by W., on the 18th, lowest pressure 29.25 inches, on the 17th. The Canadian S. S. *Canadian Inventor* experienced gales in this storm area up to the 20th of the month, when near latitude 45° N., longitude 175° E. This huge cyclone is one of those few Pacific storms whose courses may be traced with considerable accuracy entirely across the ocean. After crossing the 180th meridian on the 23d, it moved slowly northeastward into the Gulf Alaska, was over Alaska on the 27th, and on the last day of the month was headed southeastward into the Canadian Northwest. During the last of its journey over the eastern Pacific it seems to have lost energy and few gales were reported within its area.

On the 25th of February pressure again began to fall to the eastward and northeastward of the Bonin Islands, and on the 28th the American S. S. *President Jackson*, Manila toward Seattle, while in latitude 46° 13' N., longitude 166° 40' E., observed a pressure reading of 28.79 inches in conjunction with a moderate breeze from the south. Notwithstanding this very low pressure, the cyclone produced no gales of importance so far as reports indicate.

There was some storm development of moment east of the 180th meridian early in the month. A depression lay to the eastward of Hawaii on the 1st, but it apparently died out shortly thereafter or merged with the low then central over the western Aleutians. On February 4 the British S. S. *Tyndareus* experienced a southerly gale, force 11, in latitude 49° 57' N., longitude 157° 24' W., lowest pressure 29.36 inches. But the great storm of this area, as well as of the entire ocean, was that of the 13th to 16th, which lashed the Canadian and northern United States coasts with gales and exhibited its fury over a large area of the adjoining ocean. The highest wind velocities given in vessel reports of this storm were those experienced by the Panaman S. S. *Pawnee*, while on a voyage from British Columbia to Australia. During the afternoon of the 14th and the early hours of the 15th, when in approximately 32° N., 148° W., this vessel was encountering southwesterly to west-southwesterly gales, maintained from force 10 to full hurricane strength, lowest pressure 29.06 inches, uncorrected. Early on the 16th, after a lull to moderate winds which lasted for several hours, the *Pawnee* was again beset by the storm, which now gave a maximum

force of 11 WNW. at 4 a. m., after which it rapidly subsided and gave way to light airs with rising pressure.

The Aleutian Low, as such, was strongly developed over the western Aleutians until the 5th of the month, after which it was almost completely displaced by high pressure. An anticyclone which had covered the Gulf of Alaska since the 1st, persisted until the 14th, at which time the center of high pressure shifted to the region of the central Aleutians, where it remained until near the end of the month. Meanwhile, on the 14th a strong cyclone covered much of the eastern part of the ocean as far north as Alaska, and pressure remained low in the gulf until gradually displaced by high pressure on the 28th. During this period the low received several accessions from traveling depressions. Cyclones entered the coast between northern United States and southern Alaska during February on the 11th, 18th, 22d, 23d, and 26th. The last four were offshoots from the low in the Aleutian area.

The North Pacific HIGH, with some fluctuations, persisted over the eastern area until the 12th. It redeveloped on the 21st and became fairly well established with its crest to the westward of Washington and Oregon. It remained practically stationary, spreading gradually in area, until the close of the month.

The general pressure conditions over the eastern portion of the ocean, as indicated by observations at the island stations, showed a continued rise in the Aleutian area and a further fall in the region of the Hawaiian Islands. The average pressure at Dutch Harbor, based on p. m. reports, was 29.80 inches, 0.24 inch above normal and 0.09 inch above the January average. The highest pressure recorded was 30.48 inches, on the 14th; the lowest 28.76, on the 4th. Absolute range, 1.72 inches, as compared with 1.46 in December and 1.58 in January. At Honolulu the average p. m. pressure was 29.96 inches, or 0.08 inch below normal. The corresponding values for January were 29.98 and 0.04, respectively. The highest pressure recorded was 30.09, on the 3d; the lowest, 29.82, on the 7th. Observations from Midway Island were not received on the 2d and the 4th to 9th, inclusive. The average pressure for the 21 days received was 29.99 inches, or approximately normal. The highest pressure was 30.22, on the 27th; the lowest, 29.82, on the 3d and 24th.

The percentage of fog along the American coast and over waters in the neighborhood increased slightly over that of January. Fog was observed from the 2d to the 7th principally between 37° and 51° north latitude and 140° and 151° west longitude. From the 15th until the 26th it was frequent along the coast between about 33° N. and Vancouver. There were scattered observations along the 47th parallel in middle longitudes. At Swatow, China, fog occurred on the 12th to 15th, and on the 19th, and some fog on various dates was reported from near the mouth of the Yangtse River.